

Application No.: 10/066,007  
Amendment Dated: October 13, 2004  
Reply to Interviews of: October 6, 2004 and October 8, 2004

### **AMENDMENTS TO THE CLAIMS**

Please amend the claims as follows:

#### **LISTING OF CLAIMS:**

Claims 1-34. (Cancelled).

Claim 35. (Previously presented) A process for producing astaxanthin comprising:

- (a) cultivating in a suitable culture medium a recombinantly produced host cell containing a polynucleotide selected from the group consisting of SEQ ID NO: 2, SEQ ID NO: 3, a polynucleotide that encodes the polypeptide of SEQ ID NO: 1, and a polynucleotide that hybridizes to the complement of SEQ ID NO: 2 or SEQ ID NO: 3 under stringent hybridization conditions, wherein the hybridizing polynucleotide encodes a polypeptide having astaxanthin synthetase activity; and
- (b) recovering astaxanthin from the host cell or the culture medium.

Claim 36. (Previously presented) A process according to claim 35 wherein the polynucleotide encodes a polypeptide, which is SEQ ID NO: 1.

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Claim 37. (Previously presented) A process according to claim 35 wherein the polynucleotide is SEQ ID NO: 2.

Claim 38. (Previously presented) A process according to claim 35 wherein the polynucleotide is SEQ ID NO: 3.

Claim 39. (Cancelled).

Claim 40. (Previously presented) A process according to claim 35 wherein the polynucleotide encodes a polypeptide having astaxanthin synthetase activity and hybridizes to the complement of SEQ ID NO: 2.

Claim 41. (Previously presented) A process according to claim 35 wherein the polynucleotide encodes a polypeptide having astaxanthin synthetase activity and hybridizes to the complement of SEQ ID NO: 3.

Claim 42. (Previously presented) A process according to claim 35 wherein the polynucleotide is selected from the group consisting of SEQ ID NO: 2, SEQ ID NO: 3, and a polynucleotide that encodes the polypeptide of SEQ ID NO: 1.

Claim 43. (Previously presented) A process according to claim 35 wherein the polynucleotide is carried on a vector.

Claim 44. (New) A process for producing astaxanthin comprising:

- (a) introducing into a host organism a polynucleotide selected from the group consisting of SEQ ID NO: 2, SEQ ID NO: 3, a polynucleotide that encodes the polypeptide of SEQ ID NO: 1, and a polynucleotide that hybridizes to the complement of SEQ ID NO: 2 or SEQ ID NO: 3 under stringent hybridization conditions, wherein the hybridizing polynucleotide encodes a polypeptide having astaxanthin synthetase activity;
- (b) cultivating the organism in a suitable culture medium; and
- (c) recovering astaxanthin from the host organism or the culture medium.

Claim 45. (New) A process according to claim 44 wherein the polynucleotide is selected from the group consisting of SEQ ID NO: 2, SEQ ID NO: 3, and a polynucleotide that encodes the polypeptide of SEQ ID NO: 1.

Claim 46. (New) A process for producing astaxanthin comprising contacting beta-carotene with a polypeptide having astaxanthin synthetase activity in the presence of an electron donor in a reaction mixture containing a reconstituted membrane.

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Claim 47. (New) A process according to claim 46, wherein the polypeptide is present in the form of a reconstituted membrane prepared from a biological membrane.

Claim 48. (New) A process according to claim 47 wherein the membrane is a microsome or a mitochondrial membrane.

Claim 49. (New) A process according to claim 46 wherein the polypeptide is present in the form of a reconstituted artificial membrane.

Claim 50. (New) A process according to claim 49 wherein the reconstituted artificial membrane is a liposome.

Claim 51. (New) A process according to claim 46, wherein the electron donor reduces a reaction center of the astaxanthin synthetase.

Claim 52. (New) A process according to claim 51 wherein the electron donor is cytochrome P450 reductase.